

## CLAIMS

What is claimed is:

- 1           1.     A high specimen yield anti-reflux head for a needle aspiration  
2 biopsy device, comprising:  
3           a hub defining a specimen collection well and mounting a needle having a  
4 shaft with an open pointed tip; and  
5           a sample passageway extending from the pointed tip of the needle to a  
6 segment inside the hub opening in spaced relation to a floor of the collection  
7 well.
- 1           2.     The device of claim 1, wherein the needle defines the entire  
2 passageway extending from the pointed tip to a contoured proximal end.
- 1           3.     The device of claim 2, wherein the hub defines an opening in the  
2 floor of the collection well through which the needle shaft extends.
- 1           4.     The device of claim 2, wherein the proximal end of the needle  
2 includes a segment that extends along and opens about a lateral axis at an angle  
3 to a longitudinal axis of the needle.
- 1           5.     The device of claim 4, wherein the lateral and longitudinal axes are  
2 essentially perpendicular.
- 1           6.     The device of claim 3, wherein the proximal end of the needle in  
2 part follows the contour of the collection well.
- 1           7.     The device of claim 1, wherein the passageway is defined in part  
2 by the needle and in part by an internal channel in the hub.
- 1           8.     The device of claim 7, wherein the needle has a straight proximal  
2 end disposed at an opening in the hub defining an end of the channel.

1           9.     The device of claim 8, wherein the proximal end of the needle has  
2 raised barbs.

1           10.    The device of claim 8, wherein the channel includes a lateral  
2 segment that extends along and opens about a lateral axis at an angle to a  
3 longitudinal axis of the needle.

1           11.    The device of claim 10, wherein the lateral and longitudinal axes  
2 are essentially perpendicular.

1           12.    The device of claim 1, wherein the collection well has an anti-  
2 coagulant surface.

1           13.    The device of claim 12, wherein the anti-coagulant surface is a  
2 coating of ACD or EDTA.

1           14.    The device of claim 1, wherein the needle has an anti-friction  
2 surface.

1           15.    The device of claim 14, wherein the anti-friction surface is a Teflon  
2 coating.

1           16.    The device of claim 1, wherein the hub includes an outer grip.

1           17.    The device of claim 15, wherein the hub has an open mouth  
2 allowing access to the collection well.

1           18.    The device of claim 17, further including a lid securable to the hub  
2 to cover the mouth.

1            19.    The device of claim 1, wherein the collection well has a volume of  
2            at least 100  $\mu$ L.

1            20.    The device of claim 1, further including a sheath stand defining an  
2            elongated cavity for containing the needle and having an open end mountable to  
3            the hub.

1            21.    The device of claim 1, wherein the needle defines a scoop opening  
2            at a side of the needle in communication with the passageway.

1            22.    A high specimen yielding anti-reflux needle aspiration biopsy  
2            device, comprising:  
3            a syringe including a barrel and a piston slidable within the barrel;  
4            a valve for controlling an opening in the syringe barrel;  
5            a hub linked to the valve and defining a specimen collection well; and  
6            a needle mounted to the hub having a shaft with an open pointed tip;  
7            wherein one or more of the hub and needle define a passageway  
8            extending from the needle tip to inside the hub opening in spaced relation to a  
9            floor of the collection well.

1            23.    The device of claim 22, further including a coupler containing the  
2            valve and connecting the hub to the syringe.

1            24.    The device of claim 22, wherein the needle defines the entire  
2            passageway extending from the pointed tip to a contoured proximal end.

1            25.    The device of claim 22, wherein the passageway is defined in part  
2            by the needle and in part by an internal channel in the hub.

1            26.    The device of claim 25, wherein the needle has a straight proximal  
2            end disposed at an opening in the hub defining an end of the channel.

1           27. The device of claim 22, wherein the collection well has an anti-  
2 coagulant surface and the needle has an anti-friction exterior surface.

1           28. The device of claim 22, further including a sheath stand defining an  
2 elongated cavity for containing the needle and having an open end mountable to  
3 the hub.

1           29. The device of claim 22, further including a piston lock mounted to  
2 the syringe so as to fix the position of the piston relative to the barrel.

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1    30 ~~20~~. The device of claim 22, wherein the needle defines a scoop  
2 opening at a side of the needle in communication with the passageway.

1           31. A method of needle aspiration biopsy using a device as recited in  
2 claim 22, comprising the steps of:  
3           creating a vacuum in the syringe;  
4           inserting the needle into a specimen sample site;  
5           communicating the vacuum to the needle;  
6           probing the specimen sample site with the needle to collect specimens in  
7 the collection well of the hub;  
8           releasing the vacuum in the needle;  
9           withdrawing the needle from the specimen sample site;  
10          separating the hub from the device; and  
11          transferring specimens collected in the hub to an examination site.

1           32. The method of claim 31, wherein the step of creating a vacuum in  
2 the syringe includes closing the valve and pulling the syringe piston away from  
3 the syringe barrel.

1           33. The method of claim 32, wherein the vacuum is communicated to  
2 the needle by opening the valve.

1 34. The method of claim 33, wherein the step of releasing the vacuum  
2 in the needle includes reclosing the valve.

1 35. A high specimen yielding anti-reflux needle aspiration biopsy  
2 device, comprising:  
3 a syringe including a barrel and a piston slidable within the barrel;  
4 a valve for controlling an opening in the syringe barrel;  
5 a hub linked to the valve and defining a specimen collection well having a  
6 volume of more than 500 micro liters; and  
7 a needle mounted to the hub having a shaft with an open pointed tip;  
8 wherein one or more of the hub and needle define a passageway  
9 extending from the needle tip to inside the collection well.

R.I. 126  
1 ~~36~~ ~~37~~. A high specimen yielding anti-reflux needle aspiration biopsy  
2 device, comprising:  
3 a syringe including a barrel and a piston slidable within the barrel;  
4 a valve for controlling an opening in the syringe barrel; and  
5 a hub linked to the valve and defining a specimen collection well, wherein  
6 the hub defines an internal passageway for putting the collection well in  
7 communication with a lumen of a needle.

1 ~~37~~ ~~38~~. The device of claim 37, wherein the collection well has an interior  
2 volume of at least 100 micro liters.

1 ~~38~~ ~~39~~. The device of claim 37, wherein the internal passageway opens to  
2 an interior of the collection well through an opening spaced from a floor of the  
3 collection well.